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EVALUATION OF BALSAM WOOLLY APHID ON ROAN MOUNTAIN, TOECANE RANGER DISTRICT, PISGAH NATIONAL FOREST, NORTH CAROLINA

By

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INTRODUCTION

The Fraser fir (Abies fraseri (Pursh) Por.) occurs on about 60,000 acres in the Southern Appalachians. It is sensitive to attack by the balsam woolly aphid, an insect imported from Europe in the early 1900's. The aphid usually kills the trees within 2-6 years after attack. Control of the aphid is impractical due to the inaccessibility of many of the areas where the Fraser fir type occurs. However, in recreation areas and highly visible areas it is both practical and desirable. Roan Mountain on the Toecane Ranger District of the Pisgah National Forest is one such area, where the rhododendron gardens draw thousands of visitors each year.

Aerial sketchmap and ground evaluations were conducted by the Forest Insect and Disease Management Group to determine the extent and damage of the aphid on Roan Mountain. The survey covered approximately 850 acres of Fraser fir - spruce type. However, this evaluation includes only the 140 acres along State Highway 1348 and the Rhododendron Gardens. This area was last treated chemically in 1974.

METHODS

A one hundred percent aerial sketchmap survey was conducted over the Fraser fir - spruce type on Roan Mountain. Areas containing dying trees were drawn in. Ground evaluation was conducted by using randomized point sample plots based on a BAF of 10. Plots were taken within a 200 foot strip on either side of the highway. Eight plots were taken on the

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left side of the road and eight on the right (Fig. 1). Trees within the plots were examined closely for woolly wax egg masses and adults, and recorded as to whether or not they were infested. In addition, the number of spruce trees in each area was noted.

TECHNICAL INFORMATION

Insect - Balsam woolly aphid, Adelges piceae (Ratz.).

Hosts - Balsam woolly aphid was introduced from Europe around 1900. True firs are the only known hosts of the aphid. In the southeastern United States the bracted balsam fir (Abies balsamea var. phanervlepis Fern.) and the Fraser fir (A. fraseri (Pursh.) Por.) are the species affected.

Type of Damage - "Gouting" appears as a stunting of terminal growth swellings around the buds and branch nodes. Trees with this type of injury decline slowly. Growth is retarded and the dead and dying upper stem is often invaded by wood - destroying fungi. Bracted firs are mostly attacked by gout infestations.

Fraser fir is affected mostly by the more serious type of mass infestation along the stem. Stem attacked trees usually die within two to six years. The foliage on a dying tree turns yellow, then deep red or brown. While feeding, the aphid injects a substance into the bark that causes abnormal cell division. Obstruction of the water-conducting tissue seems to be the principal injury associated with stem infestations.

Life Cycle of the Aphid - The balsam woolly aphid reproduces by parthenogenesis as there are no males in North America. The adult female produces a wool-like material in which she lays amber-colored eggs. The eggs hatch into active crawlers which seek a place to feed and inserts its mouthparts. Once the mouthparts are inserted the aphid will not move again. It transforms without moulting into neosistens. Two generations and a partial third usually develop in North Carolina. Long range spread is accomplished mainly by wind.

RESULTS AND DISCUSSION

Ground evaluations show that 30 percent of the sample plots contained infested trees. Most infested plots occurred along the end of Highway 1348 near Carver's Gap. Trees ranged from light to heavy infestation. All infested trees had green tops indicating that they had become infested within the last 2-3 years. Infestations have been present in the past in the area near Carver's Gap. Salvage was conducted in and around the picnic area in 1975-1976. There was a high percent of red spruce in the area. By removing the infested fir the picnic area was converted to a predominantly red spruce type and the effect of the aphid is not noticeable. However, data collected in the remaining sample plots show there is an average of only 16 percent red spruce.

There are approximately 14.8 cords of timber per acre. Of that volume about 1.4 cords per acre are spruce. Of the remaining fir volume, an estimated 12 percent of 1.6 cords per acre are currently infested by balsam woolly aphid. This compares with 10 percent infested fir reported in 1973 for the same area.

Since the area along Highway 1348 and the rhododendron gardens are highly visible areas it would be desirable to retain the Fraser fir type in these areas to enhance and maintain the recreational value that Roan Mountain provides. In areas with a high percent of red spruce the type can be converted by careful management and salvage to that species without a noticeable visible effect on the gardens. However, in areas where the predominant type is Fraser fir it will be necessary to conduct some preventive chemical control measures to prevent further spread of the infestation and maintain the value of the area.

Recommended chemical control is to spray trees with a solution of 1/8 percent lindane in water until the bark is drenched. Treatment should be applied in the spring between May and June or in the fall during September and October, when crawlers are present.

Should a project be approved, Forest Insect and Disease Management Group will establish plots to monitor the effectiveness of the treatment. During the spring and summer of 1977, a balsam woolly aphid evaluation will be conducted that will include the entire Fraser fir area on Roan Mountain.

RECOMMENDATIONS

Recommended control measures for balsam woolly aphid are:

1. Chemically treat the Fraser fir using 1/8 percent lindane in water to kill the aphids on currently infested trees and prevent further attack.

2. In some instances, areas may be converted to a red spurce type through silvicultural management and removal of infested fir.

Note: Should lindane be used, caution should be taken to use as specified on the label and precautionary measures taken to insure safety.

REFERENCES

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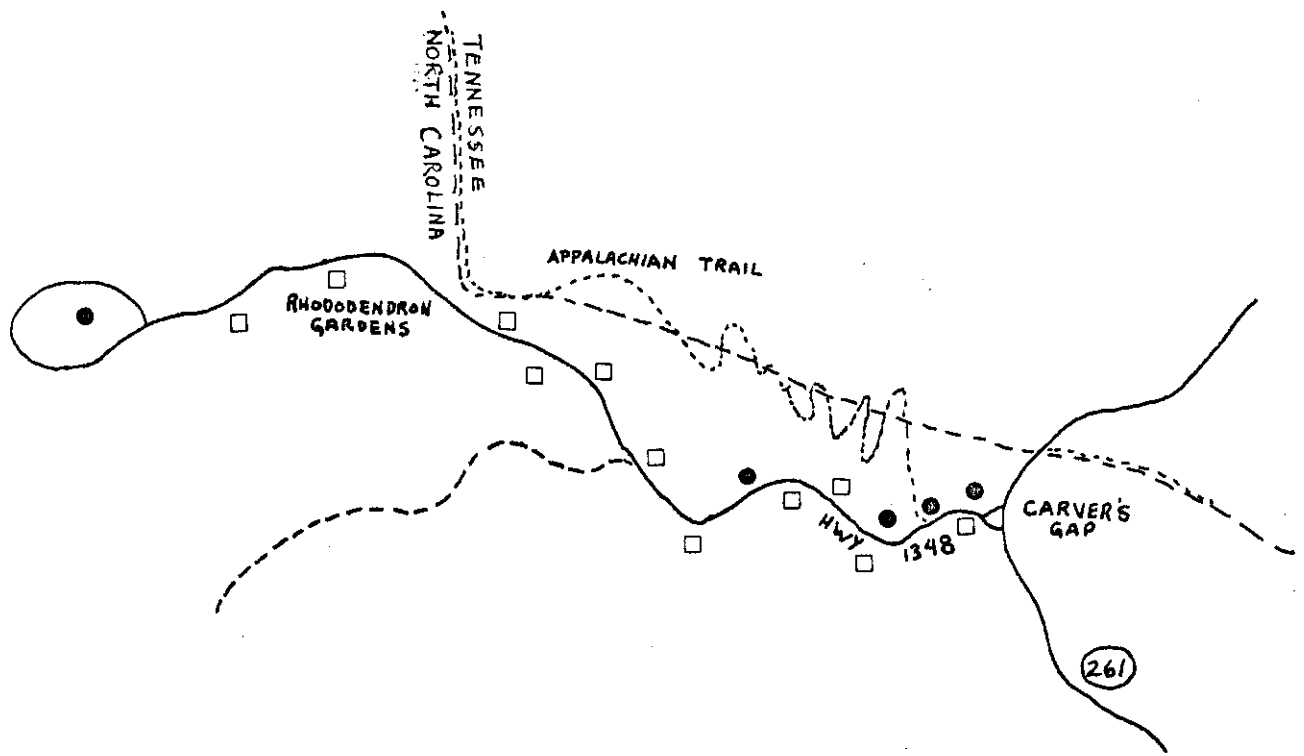

Figure 1: Approximate location of sample plots for balsam woolly aphid along Highway 1348 and in the Rhododendron Gardens on Roan Mountain, Toecane Ranger District, Pisgah National Forest, North Carolina, 1976.